

REMARKS/ARGUMENTS

This application has been carefully reviewed in light of the Final Office Action dated October 1, 2004. Claims 8-9 and 11-15 remain in this application. Claim 8 is the independent claim. Claims 8 and 11-12 are amended. Claims 1-7 and 10 are cancelled, without prejudice. It is believed that no new matter is involved in the amendments or arguments presented herein. Reconsideration and entrance of the amendment in the application are respectfully requested.

Art-Based Rejections

Claims 8 and 9 were rejected under 35 U.S.C. §103(a) over USPN 4,370,356 (Bok) in view of JPN 03-142930 A (Ogushi); Claims 10, 11, and 13 were rejected under §103(a) over Bok in view of Ogushi and in further view of USPN 4,017,982 (Goffredo); Claim 12 was rejected under §103(a) over Bok in view of Ogushi and in further view of USPN 6,406,541 (Cairncross); Claim 14 was rejected under §103(a) over Bok in view of Ogushi and in further view of USPN 5,796,952 (Komino); Claim 15 was rejected under §103(a) over Bok in view of Ogushi and in further view of JPN 02-019470 A (Fujioka). Applicant respectfully traverses these rejections and submits that the claims herein are patentable in light of the clarifying amendments above and the arguments below.

The Bok Reference

Bok is directed to the meniscus coating of a substrate by flowing a coating material through a permeable and sloping surface so as to develop a downward laminar flow of coating material on the outside of the sloping surface. The substrate surface is advanced tangentially to the downward laminar flow of coating material such that the surface to be coated intersects the laminar flow of coating material at the apex of the sloping, permeable surface. Menisci of flowing coating

material are supported both at the leading edge and the trailing edge of coating material in contact with the surface to be coated. The uniform disengagement and drainage of deposited excess coating material from the coated surface are ensured by uniform menisci and the constant downward laminar flow of coating material on the outside of the sloping surface. (*See, Bok, Col. 1, lines 40-57*).

The Ogushi Reference

Ogushi is directed to preventing contamination on wafers. A cleaning fluid in trench grooves is rapidly dried by making a high-temperature and high-pressure dry air inject on the wafers. The production of colloidal silica is eliminated due to the reaction of pure water with silicon. (*See, Ogushi, Page 1, paragraph 1*).

The Goffredo Reference

Goffredo is directed to a drying apparatus that provides a cool air screen for impelling liquid from articles being dried. The drying apparatus also employs heated air directed at the articles after they pass the cooler air knives. Air is delivered to the duct by a blower and diverted by means of an adjustable deflection plate into one of two channels. One channel directs air to the cooler air knives that effect a blowing-off of liquid from the articles, and the other channel directs air across the heated air knives so as to provide warmer drying. (*See, Goffredo, Col. 1, line 50 to Col. 2, line 4*).

The Cairncross Reference

Cairncross is directed to an improved method of mounting particles on a surface having an array of tacky and non-tacky areas thereon. The method includes obtaining surfaces having an array of tacky and non-tacky areas thereon. Flowing particles across the surface to allow particles to contact the tacky areas and adhere

thereto. Heating to a temperature of at least 30° C. Removing the excess particles not adhered to the tacky areas. (*See, Cairncross, Col. 1, lines 38-50*).

The Komino Reference

Komino is directed to a reduced and normal pressure treatment apparatus that enables improved treatment quality and throughput when performing normal pressure treatment. By shortening the time interval between the reduced and normal pressure processes, a normal pressure treatment is performed immediately before or after reduced pressure processing. (*See, Komino, Col. 3, lines 13-21*).

The Fujioka Reference

Fujioka is directed to enabling the formation of deposit film by activating raw material gas containing H with plasma of inert gas in the method for introducing precursor to be film making material and activated seed interacting with the above in film making space. (*See, Fujioka, Page 1, paragraph 1*).

The Claims are Patentable Over the Cited References

The present application is generally directed to a method and apparatus for manufacturing a semiconductor device made by forming a thin film on a substrate, such as a thin-film photovoltaic module.

As defined by independent Claim 8, an apparatus for manufacturing a semiconductor device having a thin film on a substrate includes a washing section for washing the substrate with a washing liquid. A liquid-removing section is included for removing the washing liquid from the substrate by blowing pre-heated compressed air to the substrate washed. A film-forming section is included for forming a thin film on the substrate from which the washing liquid has been removed. The liquid-removing section has an air knife which is inclined in a first

direction that is horizontally perpendicular to a transfer direction of the substrate and inclined in a second direction that is vertically perpendicular to the transfer direction of the substrate so as to blow compressed air towards a rear edge of the substrate.

Independent Claim 8 has been amended to include the subject matter of Claim 10 and to distinguish over the applied references. The applied references do not disclose or suggest the above features of the present invention as defined by amended independent Claim 8. In particular, the applied references do not disclose or suggest, "wherein the liquid-removing section has an air knife which is inclined in a first direction that is horizontally perpendicular to a transfer direction of the substrate and inclined in a second direction that is vertically perpendicular to the transfer direction of the substrate so as to blow compressed air towards a rear edge of the substrate," as required by amended independent Claim 8.

The Office Action concedes that Bok and Ogushi fail to teach that the liquid removing section has an air knife which is inclined to the direction perpendicular to a transfer direction of the substrate and the vertical direction so as to blow air to the back of the substrate transfer direction. The Office Action purports that Goffredo teaches the use of a plurality of heated air knives located above and below the substrate to be transferred, inclined to the direction perpendicular to the substrate transfer direction and arranged such that the closest ends of adjacent air knives are spaced apart at a predetermined interval in the substrate transfer direction (horizontally adjacent air knives in Figure 1) and overlap for a predetermined distance in the direction perpendicular to the substrate transfer direction (vertically adjacent air knives in Figure 1) for the purpose of removing a liquid film from a substrate. (*See, Goffredo, Abstract*).

Goffredo discloses in Figures 1-2 that the plurality of air knives 24, 25, 31, 32, 33, 34 have a backwardly or rearwardly directed discharge opening 28 or 30 to impel air delivered thereto onto surfaces of articles 22 traveling therepast, in such a way as to blow droplets of water or other liquid therefrom, and in a rearward direction relative to the direction of movement of articles 22. According to Goffredo in Figures 1-2, the air knives are inclined to a single direction perpendicular to the substrate transfer direction. Hence, the air knives of Goffredo impels air evenly across the width of the substrate so as to blow water droplets directly backwards from the substrate transfer direction.

In contrast, as shown in Figures 3-4 of the present application, the air knives 21 are inclined in a first direction (angle α) that is horizontally perpendicular to the transfer direction X of the substrate 10 and inclined in a second direction (angle β) that is vertically perpendicular to the transfer direction X of the substrate 10 so as to blow compressed air towards a rear edge of the substrate 10. Accordingly, each air knife 21 is inclined at a predetermined angle α to the transfer direction X of the substrate. Additionally, the compressed air is applied through the slit 22 in a direction Z inclined at an angle β to the direction V perpendicular to the transfer direction X. (*See, Specification, Page 10, lines 4-9*). The compressed air applied to each air knife 21 is blown toward the upper or lower surface of the substrate 10 from the slit hole 22. The washing liquid on the upper and lower surfaces of the substrate 10 is thereby pushed toward the rear edge of the substrate 10 in the transfer direction X of the substrate 10, as indicated by an arrow Y in Figure 3. As a result, the washing liquid falls dropwise and smoothly from the substrate. (*See, Specification, Page 10, lines 10-19*).

Bok and Ogushi do not disclose or suggest these features of the present invention as required by amended independent Claim 8, and Goffredo does not

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remedy the deficiencies of Bok and Ogushi. Therefore, since the applied references do not disclose, teach, or suggest the above features of the present invention as required by amended independent Claim 8, those references cannot be said to anticipate nor render obvious the invention which is the subject matter of amended independent Claim 8.

Accordingly, independent Claim 8, as amended, is believed to be in condition for allowance and such allowance is respectfully requested.

The remaining Claims 9 and 11-15 depend either directly or indirectly from independent Claim 8 and recite additional features of the invention which are neither disclosed nor fairly suggested by the applied references. Thus, the remaining Claims 9 and 11-15 are also believed to be in condition for allowance and such allowance is respectfully requested.

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Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6809 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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